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FARM IMPLEMENT NEWS

A MONTHLY ILLUSTRATED NEWSPAPER DEVOTED TO THE MANUFACTURE, SALE AND USE OF AGRICULTURAL IMPLEMENTS AND THEIR KINDRED INTERESTS.

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BINDERS.

Progress is made by steps, not by leaps; but always there were men whose ideas projected far in advance of their times. Inventors and reformers usually attempt to cover too much, in view of conditions current; and their efforts fail because people, although generally disposed to take in improved methods and theories if given regularly and in small doses, will reject the same altogether if offered in mass. They forget that the world was not made in a day—that its rock had to be covered with mold before it could take on its dress of ornamented green.

Radicals are not philosophic architects; they too often build superstructures before the foundations have been laid. Their ambition is too vaulting and too crisp; they fail because they

"Soar too high
And fall for lack of moisture quite a-dry,"

as Byron wrote of Bob Southey. Still these *Ex edici* are necessary factors in progress. Though they may flash up like rockets and come down like the sticks, their short illuminations usually point out roads which others following may pursue, more surely and successfully. Many machines and many theories have failed because their projectors built up airy edifices upon insufficient foundations; but some have failed simply because the people were not ready or fitted to receive them.

Inventors of harvesting machinery dreamed over self-raking devices and wandered among the mazy complications of combined harvesters and threshers, before any one had produced a practical cutting apparatus. Ogle and Brown got out early a promising reaper, but the people broke it up and mobbed them. These all failed, but they pointed out the roads which others took in due time.

Inventors were seeking after automatic binders—the climax of harvesting machinery—before a practical reaper had been fully found. They also were in advance of the times and conditions, and could not succeed because practical reaping machines had first to be fully developed, generally introduced, and made thoroughly familiar to farmers. Hence all the earlier efforts failed, although some of them might have been crowned with success had the conditions been favorable.

The invention and development of self-binders may be divided into three eras, the first comprising the earlier efforts, which were confined chiefly to adaptation of binding devices to reapers—some as attachments operated by attendants, and some complete and automatic throughout, but all, substantially, upon what is called the "low-down" theory. Every kind possible of material was used and every conceivable form of binder was tried, but all failed, to the extent that none established itself in the market. The second era began with the adaptation of self-binders to the Marsh harvester and runs through the various stages of development in wire and twine binders, and down to the time of the third, or current era, wherein all useless and impracticable devices have been eliminated, all material has given place to twine, and all machines upon the market, with one or two exceptions, are substantially alike in form and general principles.

My disposition is to dwell mostly upon the productions and inventors of the first era, that I may to some extent give credit and honor to men who seeking diligently failed to find success, but whose inventions, efforts and failures cleared the way for the later and more fortunate inventors and manufacturers. Some of these latter will be disappointed thinking that their inventions should have been noticed or described, but there have been so many binder patents issued during the past fifteen or twenty years and they have become so intermixed and entangled that it will be utterly impossible for me to describe or even mention any considerable portion of these later patents; the best that I can or may do will be to give my readers some general ideas of this last development.

John E. Heath, of Warren, Ohio, was the first, of record, to attempt to bind grain by machinery, and his was a *twine* or *cord* binder. His patent was dated July 22, 1850, and the claims are as follows:

"First. Gathering the grain and compressing it into a sheaf substantially as herein set forth, by means of the rake and standard.

"Second. Carrying the cord around the sheaf and holding the latter until the band is tied by means of the curved lever h, and toothed arm g', substantially as herein described.

"Third. The employment of split thimble and sliding hook to aid in tying the band.

"Fourth. Alternating the rake to gather the grain and compress the sheaf, by means of the spring, strap, and drum, substantially as herein set forth.

"Fifth. Bridging the space through which the bound sheaf drops, to support the grain while it is being gathered, substantially as herein set forth."

But little is known of Heath's binder except from his

patent. I understand that he built several machines and that they operated fairly well for a first effort. They must have given good promise as he sold the right to the southern portion of Illinois for \$4,000 to S. H. Tudor in 1851, and made other transfers on record.

He was born in Tolland, Conn., March 19, 1806. At the age of twelve he made ax-helves and ox-yokes by machinery. He removed to Ohio at an early date and there conceived the idea of a binder. Somewhere about 1840 he took first premium for his mower at the State Fair in Chicago, and in 1855 was awarded the \$1,000 grand gold medal offered by the Massachusetts Agricultural Society for best mowing machine. He died at Prairie City, Ill., July 16, 1881.

The next patent for a binder was granted to Watson, Renwick & Watson, May 13, 1851. This patent is a curiosity and a study. The specification is exceedingly long with many drawings, and it is reinforced by two or three pages of modifications; the inventors evidently intending to cover every form of binding device that they could think of. Their first claim reads as follows: "The method of raking and binding grain at one operation, by the mechanism herein specified or its equivalent." That was comprehensive and broad enough surely. The next claim relates to the self rake, which was a toothed arrangement, sweeping the grain lengthwise of the platform and delivering to the binder located at the end. Their third claim reads "the method of adapting the

of variations and modifications added. Looking at the model one would think that nobody would covet the job of building a full-sized machine. It was a mass of ingenious, but impracticable devices, and the patent is well known in the courts, as it has been a stumbling block in the way of later inventors.

Mr. Watson became a noted patent lawyer, was assistant secretary of war under Stanton, and afterward president of the Erie Railway. He died a few years since. Mr. Renwick, in green old age, still tells what he knows about patents, in this line particularly.

These first three efforts were made with *cord* or *twine* as the material for binding.

The next patent on binders was granted to J. E. Nesen, of N. Y., Dec. 13, 1853. He employed an endless platform apron, having an intermittent motion for carrying the grain to the binder hooks which compressed into bundles that were bound with *straw* bands. It was not an automatic binder, of course.

Geo. W. N. Yost, of Mississippi, Jan. 1, 1856, obtained patent on a machine for binding with a *cord* band, cut to right length, with a knot tied in one end. This knotted end was placed in a notch and the other end went somewhere. A gathering and compressing apparatus swept along the platform, forming a bundle, around which the band was brought somehow—when its ends were tied by an attendant.

W. E. Pagett, of Virginia, July 29, 1856, used *metal strips* prepared with hooks and rings in combination with slide and "way," by which the bands were put around the bundle and hooked together.

These three last described were not automatic and they added nothing to advancement.

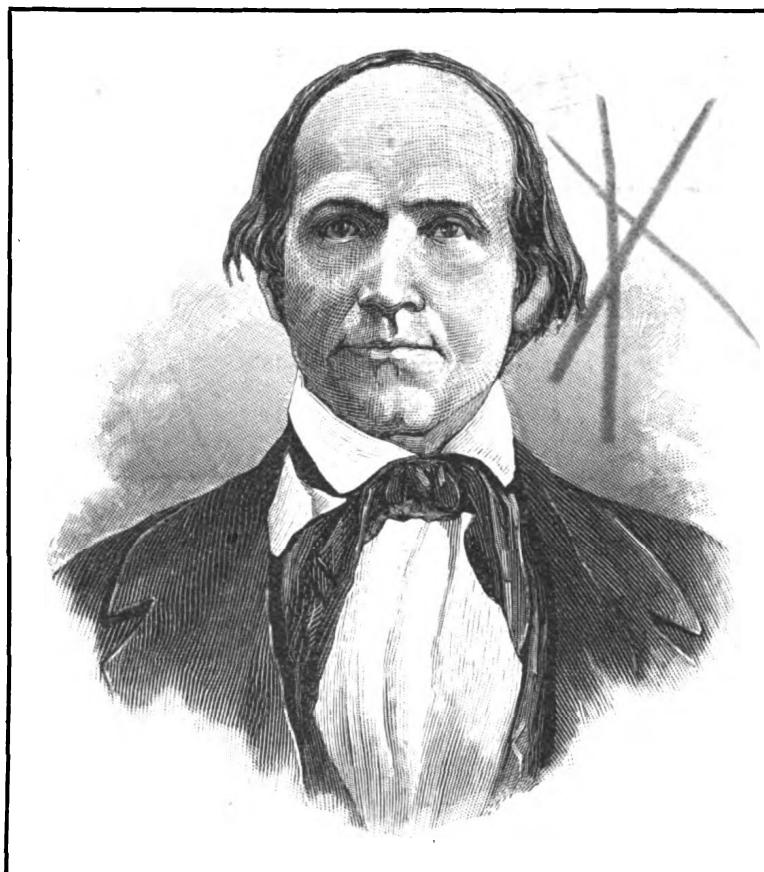
The next machine showed decided progress. This was the invention of C. A. McPhitridge, St. Louis, Mo., to whom it was patented Nov. 18, 1856. The theory of it is very well given in his claim: "The combination of the reciprocating arm G, with spring pliers G attached, with stationary arm M, revolving twister r, cutting plate q, friction brake q', spring u, and movable plate o; when the same are constructed and arranged to operate in relation to each other and the main frame and driving wheel, for the purpose of binding grain from a continuous coil of wire," etc.

He was the *first to bind with wire*, which was coiled upon a reel and delivered to the reciprocating binding arm; the latter performed its functions substantially like the modern arm, and the wire received the ordinary twist and cut.

During the year 1857 four binder patents were issued as follows: April 28, to J. F. Barrett, New York; May 5, to H. Kellogg, Marengo, Ill.; Sept. 22, to J. F. Black, Lancaster, Ill., and Dec. 29, to L. D. Philips, of Chicago. All were for improvements in, or *aids to hand binding with straw*. Each inventor had his own peculiar devices, more or less complicated and of no use whatever, except to show how much ingenuity a man may expend in providing a machine to do a thing which can be much more quickly and easily done without it. It is a singular coincidence that during this same year the Marsh Bros. were inventing their harvester and seeking the same end—rapid straw binding—but in another way altogether, their plan being to deliver the grain by the machine in the best possible condition and position to the attendant binders riding, leaving them to do the mere tying by hand, free from and undisturbed by any such traps or aids.

Allen Sherwood, Auburn, N. Y., Jan. 26, 1858, took out a patent, and Sept. 14 another, covering devices in his *wire* binder. The first patent claims binding the grain by means of a wire, placed on a spool and carried partially around the grain by the arm, in connection with twisting and cutting devices; and the second claims—in combination with fingers, for throwing the gathered grain up into the concave, the arm for carrying the binding wire up and over the sheaf and placing the wire in the slot of the *twisting wheel*; also he claimed the combination of the *sliding knife* with the twisting wheel for cutting off the wire; the twisting wheel with the wire carriers; and finally the "forming a knot or enlargement on the end of the wire behind where it is cut off by the cutter, by twisting that portion of it," for the purpose of preventing the end from being drawn out of slot in twister. (Aug. 30, 1859, he took out another patent covering improvements in his machine.)

Sherwood's binder was very ingenious and did good work. It was intended for attachment to reapers of the time, hence was not fully automatic but required an attendant to work it. He spent several years in developing and in trying to introduce it; a considerable number was built and used, giving promise of ultimate success, but the prejudice of farmers against wire and its high price proved too much for him. He fought manfully—working his binders about the country and at fairs, and he only failed because the conditions were too unfavorable. The following incident is related of him: At the Illi-



JOHN E. HEATH, THE INVENTOR OF THE FIRST BINDER.

binding apparatus to the length of the cut grain either by moving the cutting apparatus backward and forward to accommodate the binder, or by moving the binder "nearer to or further from the front of the platform in such a manner that the sheaf may be bound near the middle of its length," etc. The next claim covers the *automatic principle*, the parts "acting in connection and automatically, by motion derived from or dependent upon the movement of the machine," etc., and the fifth covers the *cord arm*, which with the cord or twine encircles the bundle—the cord paying off from a reel and through the end of the arm in the usual way, substantially.

It shows two ways of fastening the band: one by passing the end of the cord through an eyelet which is closed down upon them by a blow from a plunger, the other by making a knot.

Apparently everything necessary in the way of a binder was thought of and much more, but it did not get beyond experiments.

P. H. Watson and E. S. Renwick, two of the three inventors whose patent we have just described, were granted another patent on binders Dec. 6, '53. This is an exceedingly complicated thing, but its general form more nearly approaches the modern harvester and binder than any other of these early inventions.

The grain was to fall upon revolving bands, and was to be carried up by a series of such bands into a sort of crib, in which it was to be bound and from which it was to be delivered upon the ground. The binding was to be done with cord or *twine*, tied with a knot, and all the movements were *automatic*. This also had several pages

inois State Fair in '62 or '63 Sherwood had his binder, and after a hard day's work of operating his machine and answering the many questions and objections made, worn out he laid down in a tent and dropped asleep. Others in the tent noticed that he was muttering to himself, so they stirred him up. He rolled over exclaiming, "Wire won't hurt the cattle—they won't eat it;" another punch brought out, "It is perfectly simple—a boy can manage it," presently they punched him again and this time he called out, "Come up ladies and gentlemen and see how a binder works." He deserved better luck, but he had to "walk the plank" like scores of other meritorious inventors.

1858, March 2, W. L. Childs, New York, patented an ingenious *twine* binder. The cord was taken from a spool located in the grain-wheel divider; it was passed under platform and around in front of receptacle into nippers, above, in the arm; a self-rake swept grain against cord which was forced back, receiving and encompassing the gavel; then the arm came down, the twine was cut off, and the ends were twisted and tucked under automatically. He also had a bundle carrier. March 23 patent was issued to A. F. French, Vermont, covering devices for aiding attendant to bind with *straw bands*, twisted by hand. May 11, to G. Notman, Ohio, for a mechanism by which the binding was done with *cords* cut to lengths and placed by an attendant. July 6, to John P. Manny, Rockford, Ill., on a machine something like the last, for binding with a *prepared cord band*, cut to proper length, having knot tied in one end and a little cast hook on the other, placed in position by an attendant, but automatically passed around the compressed gavel—hook and knot engaging as bundle expanded when loosened from the compressor: the binding mechanism operating in combination "with a rake that automatically throws itself out of gear," etc.

Aug. 17. C. W. and W. W. Marsh patented their *hand binding harvester*, which, though not belonging specifically to this class, became finally the foundation upon which practical binders up to this time have been built.

To J. Mitchell, Sept. 7, was granted a patent for an *automatic straw binder*. "This invention consists in the use of clamps or band carriers, a band twisting device, tucking rod, and discharging device applied to the reaper arranged relatively with each other and operated, whereby the grain is bound into sheaves and discharged upon the ground, the whole working automatically as the machine moves along." It was not practical.

The next patent, Nov. 16, to Wm. Gray, Ohio, covered very ingenious contrivances for binding *automatically with straw*. The idea was suggested to him by the peculiar automatic self-rake of Je-arum Atkins, mentioned in our history of "reapers." "Spring talons forked at ends and mounted on a turning post like Atkins' self-rake, are brought down to the gavel by cam slot in post; they descend so that one talon strikes the heads and the other the butts; their spring ends being forced into the grain pick up a wisp for a band; they then turn at right angles to the gavel placing the wisp or band across it; descending further and coming together with band carried around the gavel, the ends of the bands are twisted by rotating pliers and tucked under; then the talons raise, lifting the bundle and dropping it on the ground, and go back to place to repeat," etc. One feature is deserving of particular notice which is described in first claim. "The arrangement of gravitating platform F. 19, and the series of levers G H I J, with their accessories, in the described connection with a drive-wheel, for the *automatic starting of the binding mechanism* by the weight of the sheaf or gavel;" that is, the weight of the sheaf threw the binder in gear.

1859, Mar. 8, to A. Ralston, Pennsylvania, patent was issued on device for assisting attendant to bind with straw. It had a "shocking-carriage" attached, in which a shock was formed and dropped upon the ground through its bottom. To J. D. Osborn, Michigan, June 14, for a *twine* binder, of which the claim is as follows: "A binding knot composed of three loops passed through each other, when said passing of the loops through each other, is effected by machinery driven or moved from any of the moving parts of a harvesting machine, and whether accomplished by the means herein stated or by their substantial equivalents." The cord or twine was taken from a reel. To F. Meyer, Illinois, Aug. 2, for a very ingenious and complicated series of devices by which a *straw rope band* was twisted from the butt of the gavel and wound around the latter while being turned or rotated for the purpose. To C. H. McAleer, Wisconsin, Aug. 16, for devices to aid attendant in binding with straw by hand, and Oct. 11 to J. McAleer for improvements on the same. To C. H. Durkee, Wisconsin, Nov. 22, for mechanism arranged to assist attendant in binding with *string* bands, cut and prepared.

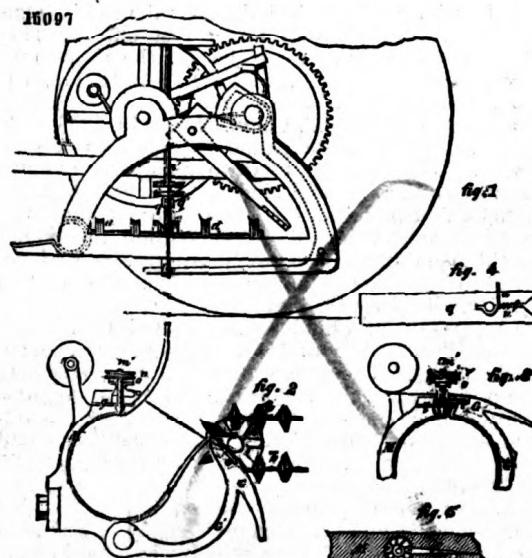
1860, May 22, a patent was issued to D. W. Ayers, Illinois, for a *wire* binder, having a rotating arm twisting device, cutter and holder—"all the parts working automatically by the turning of a shaft, and a gavel bound at each revolution of the shaft." To H. Kaller, Illinois, June 5, for a *wire* binder with vibrating curved arm, and means for twisting and cutting the wire; and to A. B. Smith, Pennsylvania, June 19, for *cord* binder, the chief feature being its compressing arms, working independently of the cord arm, etc. June 26, W. W. Burson, Illinois, obtained his first patent. This was for a *twine* binder, to be used upon any reaper and to be operated by an attendant. It tied a knot in the cord by means of hooks working together. July 10 a patent was granted to T. Courser, Illinois, for an automatic knot-tying device for *twine* taken from a reel. On 17th of same month to J. S. Hickey, Illinois, for a binder to be operated by hand—nothing new, and to Chas. Marston, Wisconsin, Aug. 14, for a very cumbersome and complicated machine for binding and shocking; devices to aid attendants riding to bind with straw band.

It will be noted that all but two of the binder patents of 1860 were issued to citizens of Illinois, and one of these hardly belongs to the class.

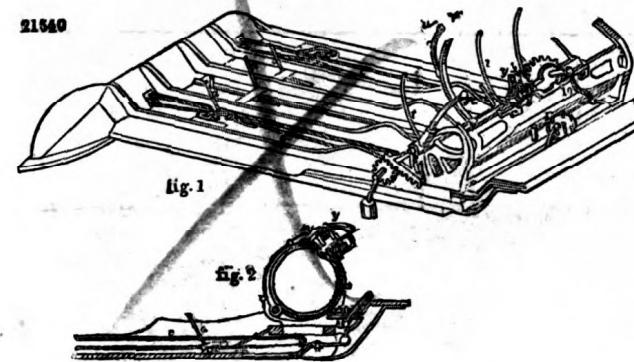
1861, Feb. 12, to S. Reynolds, Rhode Island, a patent was granted for a *wire* binder, with arm, twister and cutter, operating automatically. Specification is long, end-

ing with twelve claims, but not showing anything new. To L. P. Harris, Ohio, Feb. 26, for another *wire* binder, which also discovers nothing new.

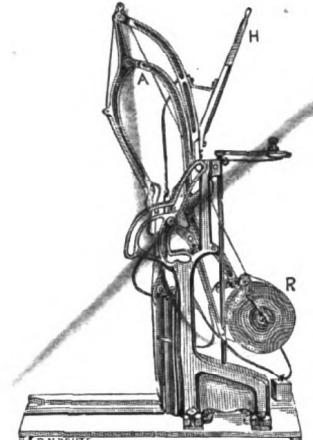
W. W. Burson, then of Yates, but now of Rockford, Ill., took out patent same date, Feb. 26, 1861. This was for his *wire binder*, and it was the foundation of a machine that made more stir, and came nearer to practical success and public approval than any other of the various binders belonging to the first era. It was constructed as an attachment to the ordinary reaper. As the gavels were raked into the binder, an attendant sitting beside it turned a crank giving the necessary movements for binding the bundle. Other patents for improvements were issued to him as follows: To H. M. and W. W. Burson, March 3, 1863—H. M. Burson died about this time—to W. W. Burson, Aug. 11, 1863, also Oct. 4, 1864, and July 25, 1865, the two latter patents covering devices for adapting his binder to the use of twine. Burson's first binder built in 1859, patented June 26, 1860, and mentioned be-



M'PHERTRIDGE, 1856—FIRST WIRE BINDER.



SHERWOOD'S WIRE BINDER—1858.



BURSON'S WIRE BINDER—1861.

fore, bound with twine, but as that material was not easily obtained he turned his attention to wire. He had two wire binders at work in the harvest of 1860. The next year some twenty-five of them were built at Muscatine, Iowa, for attachment to the John H. Manny reaper, and were worked in harvest, from Vandalia, Ill., northward as far as Red Wing, Minn., several being sold to farmers. In 1862 about fifty more were made. One of them was at the great reaper trial held at Dixon, Ill., that year; it made a decided sensation and notices of its work appeared in many newspapers of the time. As said by the Chicago Tribune: "The great feature of the day which never failed to draw the crowd was the grain-binder of W. W. Burson;" and by the *Farmers' Advocate*: "Burson truly had an ovation that must have been gratifying to him," etc. We have not space for the many and extended notices. It was used on a John H. Manny six-foot-cut reaper, made by Talcott, Emerson & Co., of Rockford, Ill. Burson arranged with this firm to build for him 1,100 of his binders for 1863. These were good machines and worked well, but the prejudice against wire and its cost at war prices operated against them. They were mostly sold, however, and used for many years thereafter; but a profitable market could not be established for them, so their manufacture was discontinued.

Yielding to the objections against wire he turned again to twine—inventing and substituting a knoter in place of his wire twister, and he had this in successful operation in 1865. During the winter following Mr. Emerson went to every twine factory in the United States, and to agents of foreign manufacturers of twine, to find or to get made what should be sufficiently cheap and also strong enough

for practical use as material for binding. Nothing then could be produced on account of war prices and crude machinery, that would answer the purpose. Still determined to succeed, Talcott, Emerson & Co. imported machinery and began manufacturing twine, but their factory burned up soon after and they subsided.

At this time, too, the Marsh harvester was rapidly gaining favor, and on the score of economy was a successful competitor against any sort of binder, no matter what kind of material might then be used on the latter. Mr. Burson says that he got on a Marsh harvester cutting rye in 1866, and bound two rounds alone, at first trial. He decided there that a binder had to be made fully automatic, and that material for binding must be cheaper, to enable a self-binder to compete with the harvester.

He halted for the time and turned loose his inventive genius upon knitting machinery. Meantime binders had come to the front as adapted to the harvester—while he had been getting new ideas in tying, from the knitting devices. This brought him back again to his first love; so since 1878 he has been hard at work on his new self-binder, which to me appears to be a rare combination of simplicity, certainty, and adaptability to all sorts of twine and all conditions of grain.

I have given particular prominence to Burson's efforts, because his was the last and greatest struggle for the market, made during the first era of binder development; his inventions have been of a practical character, and he has been very unfortunate, not through lack of merit but because of adverse circumstances and conditions.

I now return to binders in their course.

1861, Oct. 29, to C. Alvord, Wisconsin, patent was issued for reciprocating gavel carriers, presses, etc. To C. Powers and P. Lancaster, Michigan, Oct. 29, for a twine binding attachment which had considerable merit. The chief feature was a rotating head in connection with a swinging arm. The ends of the cord were held by a tight twist.

1862, April 15, to A. S. Harding, New York, a patent was issued for a machine to rake, and to bind grain with straw taken automatically from a box, put around gavel, and ends twisted; clamps and other devices helped to do the business. To J. H. and A. E. Rodstone, Indiana, Aug. 19, for rake and straw binding devices, and to J. M. Grosh, Pennsylvania, Oct. 28, for something of same general character. 1863, Jan. 13, to H. Palmer, New York, patent was granted for an automatic *twine* binder. The grain was drawn from a slotted platform by a reciprocating rake when it is caught by a cradle, and delivered to hooks, clamped and bound by series of operations and devices which I have not room to describe. To R. D. Brown, Indiana, April 7, for a complicated machine which, in addition to binding the sheaves, deposited them in bunches on the ground, and had a device for *counting* the number thus dropped. To W. H. Harrah and H. P. Jones, Iowa, June 30, a *wire* binding attachment operated by an attendant; wire twisted and cut as usual. To J. Judevine and Z. Shaw, Wisconsin, July 14, for another such wire binding attachment. To A. B. Smith, Pennsylvania, July 28, for improvements on his twine binder first patented June 19, 1860. To A. Underwood, Wisconsin, Aug. 11, for a very ingenious automatic twine binding attachment which was constructed on its own platform taking the place of the

reaper platform when attached, and forming thus a complete machine. Cord was twisted and then tied. An automatic fork discharged bundles. To W. D. Harrah, Iowa, Dec. 22, for a novel binding mechanism, the gavel of grain being pressed endwise into a compressing tube on which were prepared *endless* bands, one of which was slipped over the sheaf as it passed out of the tube—the expansion of bundle tightening band around it.

1864, Jan. 26, S. T. Holly took out two patents on binder, but I have no description of them. Jacob Behel, then of Earlville, now of Rockford, Ill., Feb. 16, obtained patent for one of the most important inventions ever made on binders, viz.: The *knotting bill and turning cord holder*. The bill, which was substantially like all in use now, seized the portions of the cord which were to form the knot, and looping the same, moved back past the knife which severed the cord at the proper point, leaving the end of the cord from the reel (or ball) firmly held by the turning cord wheel, etc. Mr. Behel in connection with W. Hedges took out another patent Sept. 6, which has, among various claims, one for an adjustable cord guide located between reel (or ball) and binding arm; and his patent of Sept. 19, 1865, claims a friction apparatus, swinging frame and cord guides, for the cord as taken from spool (or ball), also the combination of tying bill and moving knife.

Mr. Behel was a meritorious inventor but unfortunately he was too early; for when the time came for all the world to use his inventions his patents had nearly or quite expired.

To S. J. Wallace, Illinois, April 12, 1864, a patent for a wire binder was issued having several ingenious and important features—rake for giving motion to twister, etc.—but it is too long and complicated to describe. T. T. Curtis, Michigan, May 3, for a machine combined self-rake, binder and shucker.

During the balance of the year no binder patents were issued except those to Burson and Behel already mentioned.

This brings me down to the year 1865 on all the binder patents issued previously, and here I shall stop taking them *in course*, for lack of time and room, and because also here ended with Burson's final effort, all hope, on the part of practical men, of establishing a marketable self-binder with conditions as they were—i.e., with material for binding so dear; with the difficulties in the way of making any binder work in connection with a reaper or on the "low-down" principle; and with the Marsh harvester on the market then, as a successful competitor on the score of economy against any binder, no matter how thoroughly practical in operation it might have been. It is somewhat remarkable, too, that the Marsh harvester which at that time repulsed binders, should be the very machine which a few years after invited them on.

The first clear idea of an automatic binder as an at

tachment to our harvester I got in July, 1870, in this manner: I was then operating one of the machines, which we had sold to the government, at Ungarisch Altenburg, Hungary, upon the farms connected with the Agricultural College. Prince or Arch-Duke Nicholas, of Wirtemberg, was stopping there at the time and became very much interested in the trials of machines then in progress. One afternoon after he had followed the harvester around several times—watching the operations of machine and binders as he had frequently done before—he asked me to have them stop at the end furthest from the crowd (which by the way was not allowed to follow). He then said that such men as they had in Europe would never bind by hand successfully, but that an automatic binder should be put in their place. Evidently he had been studying the subject, for he explained quite in detail his plan—the location and movements of the binder, which was to use wire; in short he gave me the general outline, which several years after I saw in Gordon's "Crane" binder; and he asked me to remain over and help him, with such good mechanics as we could get at the institute, to produce a binder for the following season. I had no idea, then, of the importance of his suggestion, and gave it scarcely a thought, except to wonder at his inventive disposition, and I never heard further of him, but I suppose he may have said many times since, when he has seen harvesters and binders at work, "Why, I invented that binder back in 1870;" with more reason, too, than some I know who, always ready with suggestions, often hit what you are *doing* or going to do, and then claim as their own what you have produced. I notice, however, that these folks never claim what fails.

To resume: I pass over several binder patents granted during the year 1865—none representing successful inventors or machines, until I come to two issued Dec 19, to S. D. Locke, of Janesville, Wis., one covering compressing device, the other his rotating hook twister. As I shall hereafter confine myself to successful inventors, and to practical devices, chiefly; or to such matter only as I may consider of interest to my readers; and as Mr. Locke is the first man in the Patent Office who finally produced a thoroughly successful binder, I shall follow him down to success. And probably that plan will afford me the easiest way out of this scrape, so I shall handle others in the same manner as I come to them.

Locke says he began in 1861 to build a binder which after nearly completing he abandoned, and commenced on one of another style or plan. From this commencement to 1869 he was engaged in efforts to adapt binders to reapers, working on different plans and taking out various patents. In the spring of 1869 he arranged with Walter A. Wood & Co., of Hoosack Falls, N. Y., and went there. He tried first to fit his binder to the Wood self-raker; gave that up and then put one on a heading machine, operating it with fair success in 1870. The company built several for these headers the next year. In 1872 he attached one, as he says, to "a harvester of the modern or Marsh type." They built five on this plan in 1873, of which four were used for that harvest. Next year a few more were built and the next three hundred, and after that they were put upon the market of the world in large numbers by the Wood Company, up to 1880, inclusive.

Mr. Locke took out patents too numerous to mention. He claims to be the first man to build an automatic binder as a distinct and separate machine for attachment to a harvester, and Walter A. Wood & Co. were the first to build and put regularly upon the market successful automatic binding machines. Their Locke harvester and binder is too well remembered or known to need any description. Mr. Locke, since twine has become the accepted material for binding, has turned his attention in that direction, and is now with the Wm. Anson Wood Company. While it is probably true that Mr. Locke was the first inventor of binders on record who made a final success, and that such success began with the adaptation of his binder to the Marsh harvester in '72, yet to S. D. Carpenter, of Carthage, Mo., then of Madison, Wis., probably belongs the credit of the first attempt of the kind. He seems to have been the first to discover this necessity to binders: the elevation and then downward delivery of the flowing stream. He began his binder work back in 1861 or '62, in the usual way for attachment to reapers; and although there is some dispute or discrepancy as to dates he certainly had a binder on a Marsh

harvester as early as 1867. His machine created considerable of a sensation, was successfully exhibited and a number experimentally built, but they did not get upon the market. He now edits a newspaper at Carthage, Mo.

In the long list of meritorious inventors the name of James F. Gordon, of Rochester, N. Y., and of his brother, John H. Gordon, should stand out prominently on account of their valuable work and their persistent efforts.

to provide funds for this development. He built several for the next season which were used in the field, and exhibited at fairs; but success was not assured until in 1871, when he procured a Marsh harvester and attached his binder thereto, with which new combination he did good work that harvest.

He continued on this last plan, assisted by his brother, John H. Gordon, through 1872 and 1873, building, perfecting and exhibiting their binders as attached to Marsh harvesters. Aug. 27, 1872, he obtained patent on the improved machine; and June 16, 1874, on another. On account of peculiar construction one of these early binders was designated the "gaveller" and the other as the "reciprocator."

John H. Gordon, then living at Kalamazoo, Mich., built his first "packer" binder during the fall of 1873, and prior to next harvest three were completed for the market. He bought three Marsh harvesters upon which to place them. One of the machines thus combined he sold to Ed. McElroy, living near Kalamazoo, for \$300 cash. This is believed to be the first cash sale of an *automatic* binder on record. It did excellent work and bound about one hundred acres.

Joining interests at this time, the Gordons licensed the McCormicks, in 1874; and in 1875 Gammon, Deering & Steward. J. F. Gordon produced soon after what was known as his "Crane" binder, which was built largely by Gammon, Deering & Steward. D. M. Osborne & Co. also built this, taking license from both the brothers on their machines; and D. M. Osborne afterward bought an interest in their patents.

J. H. Gordon next invented his "crank and guide-arm" or the Buckeye wire binder—so called after this concern took license and began building; this was in 1878. Next year Walter A. Wood & Co. took a license on this last machine as improved, and made a couple of hundred before they switched off to twine.

Having thus brought their several wire binders to a high state of perfection (and it is a striking peculiarity that all worked well from the start) with several of the largest manufacturers as their licensees, building thousands annually, the world seemed fairly in their grasp, when suddenly the twine binders

surged to the front and captured the whole trade. Since then they have turned their attention to twine-binding machinery of the "low-level" type, with successful results they say.

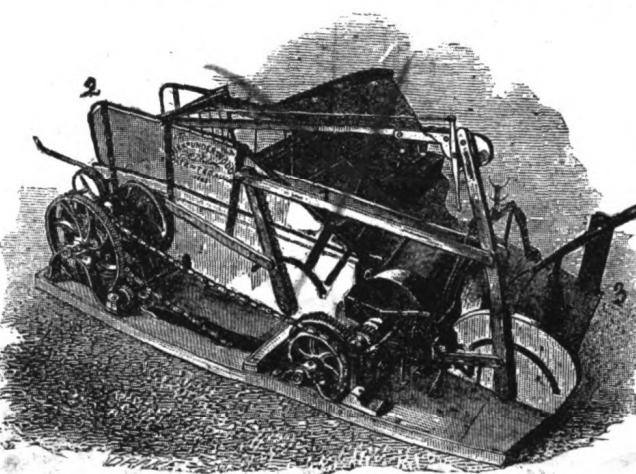
The various patents covering and contracts relating to these binders have resulted in much litigation—with the McCormicks, who settled, and with others who have not. I have no remarks to make thereon, except that now the patent lawyers and experts are doing their share of the cutting, binding and *harvesting*.

To D. M. Osborne much is due for the prominence of the Gordon "crane" binder. The company, of which he is the head, built largely, using both wire and twine; but with the others they abandoned wire altogether, and have since been manufacturing the Appleby, constructed in accordance with the distinctive marks of their great system.

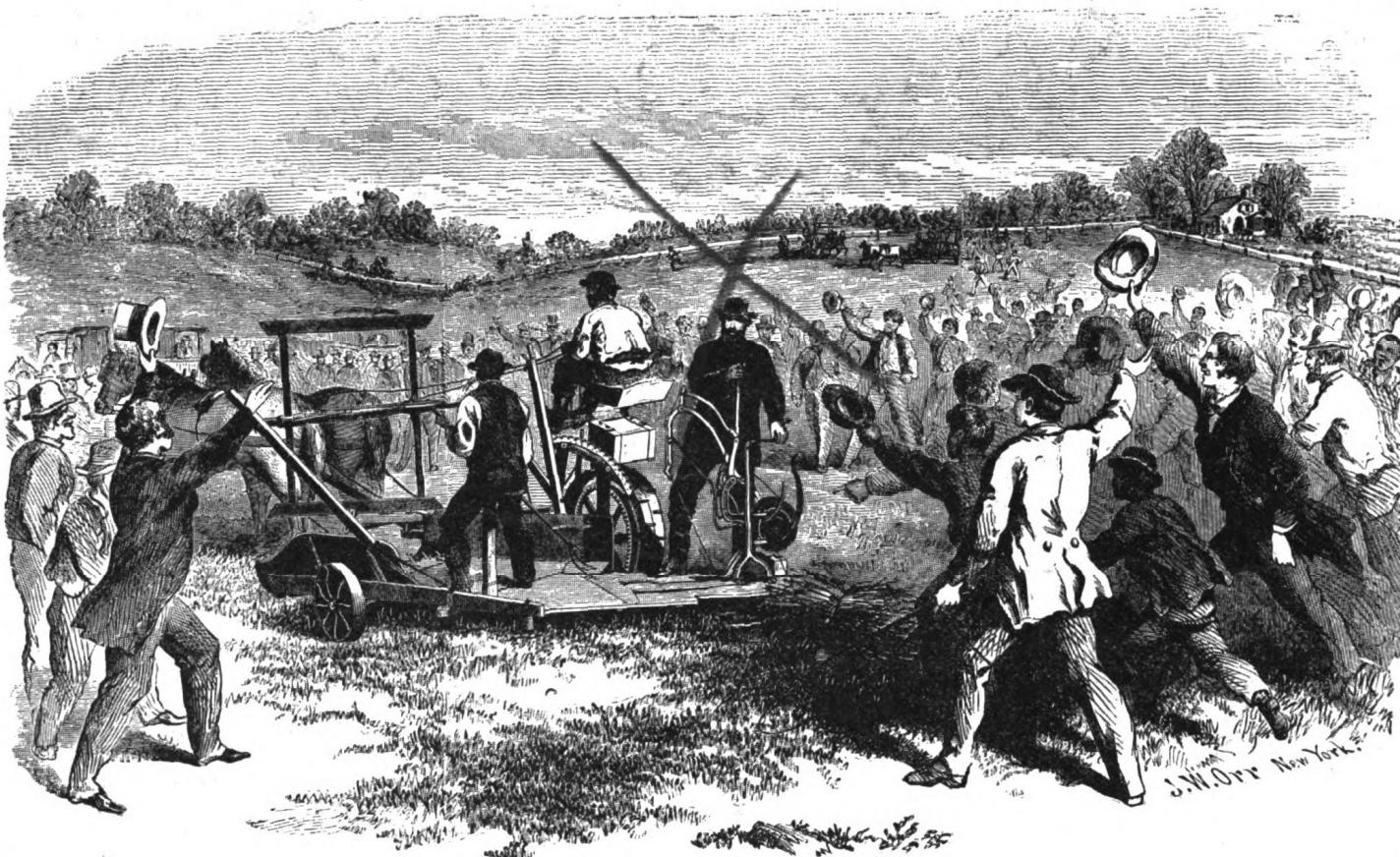
These men, for what they have done in the development of practical binders, deserve all the mention I have made of them.

Along in the early part of the "seventies" several ingenious binding machines were patented by various inventors. W. H. Payne began them and continued thereafter with varying success, until the Appleby swept him and others out of the market. It is said that he was the first to use a bundle carrier with a binder. There were Spaulding, with his measuring or trip device; Barta, Chapman, and Fowler, with his ingenious mechanism for stitching a band around and into a bundle (I am familiar with the latter to the tune of several thousand dollars). Keller and Storle did good work, so did Travis and Steward later. And there was poor John H. Whitney, as brilliant a genius as I ever knew; he patented his binder—low-down of course—in 1870 and '72, and was making rapid steps toward success, but his fire was too intense and he soon burned out, dying in 1872, if I recollect aright.

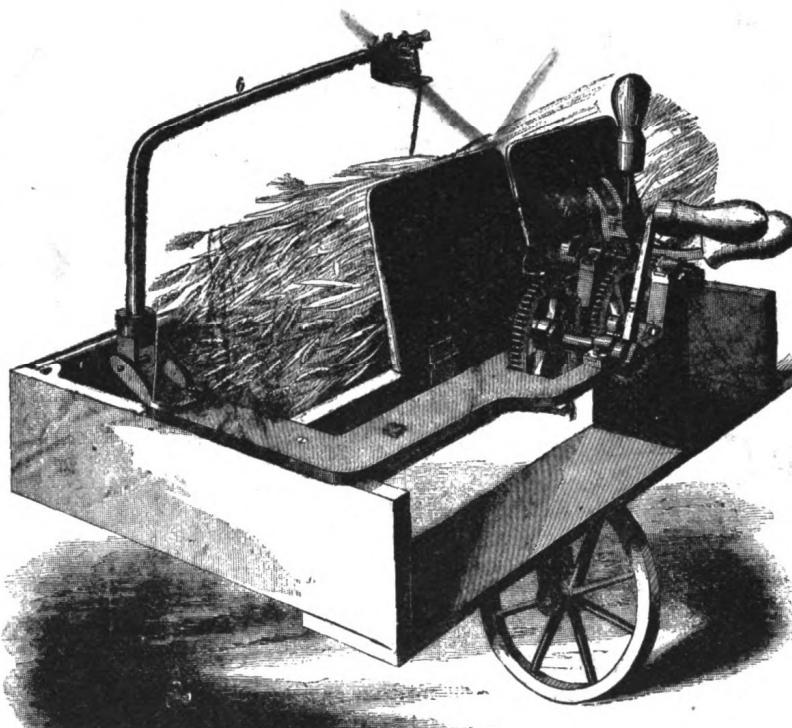
Geo. Draper, of Mazomanie, Wis., an Englishman by birth, but forty years in this country, while an invalid, invented and had built in '70 and '71 a very ingenious binder, applying it to the Kirby reaper. I am told that it was a very creditable effort, and that among other



A. UNDERWOOD—1863.
Fig. 1—Outside Divider. 2—Inside Gatherer. 3—Where bundle was discharged.



BURSON'S BINDER AT THE GREAT REAPER TRIAL—DIXON, ILL., 1862.



POWERS & LANCASTER'S BINDING ATTACHMENT—1861.

Both are young men yet. James F., however, is broken down physically by overwork and mental anxiety.

He began inventing in this line as early as 1862 and had a full-sized machine in 1864. He continued his experiments under adverse conditions—lack of means, and other disadvantages—getting a second machine built in Kalamazoo, Mich., in 1867; and another done in Rochester, N. Y., in 1868, which was successfully operated near that city and elsewhere during harvest. May 12, of that year, his first patent was issued. Meantime he had been compelled to dispose of some interests in his inventions

practical devices it had an automatic trip lever for starting the binding mechanism, under pressure from the grain. Ill health and lack of means prevented the full development of his ideas.

So much misfortune had all along befallen these various efforts to attach binders to reapers that the attention of inventors about that time became directed to another method of gathering and binding the grain, resulting in the peculiar machine called the Gleaner, which is a binder attached to a raking device for gathering gavels, deposited on the ground, from a reaper, and binding them. A patent was granted to M. T. Ridout, Nov. 14, 1871, for the *first gleaner*, I believe. Other patents were issued on this style of machine to J. A. Scott in '73, Leuz and Wittker in '74, and along afterward to R. Eickmeyer, M. G. Hubbard, Sam'l. Johnson, W. N. Whately, etc.; and many of them have been built and used successfully, especially in the Eastern and Middle States.

Had Marquis L. Gorham, of Rockford, Ill., lived to complete his work, it is altogether probable that his name would have been first among those of the successful inventors of twine binders. He began on his binder in 1873 and had it done for the harvest of 1874. He attached it to an "altered-over Marsh harvester," that is, according to the testimony; "the binders' platform of said harvester was taken off and a frame attached to receive the binder; the binder was put upon that frame." This machine did good work in the harvest of 1874, cutting and binding many acres. It may be considered the prototype of the Appleby. Mr. Gorham obtained patents on it Feb. 9, and March 16, 1875. He continued his experiments, making improvements and applying for patents thereon, until sickness intervened, and finally death—which latter occurred in the fall of 1876—brought rest to his over-taxed body and brain.

Some efforts were made to finish his work, but the master spirit was no longer present to guide it to successful completion, and it was not pushed forward with sufficient promptitude to obtain place before the Appleby had captured the market on this style of machine.

Mr. Gorham was a brilliant inventor; quick in perception, rapid in execution, and practical always. He added much to the perfection of farm implements; his seeders, cultivators, etc., are well known all over the western country.

The St. Paul Harvester Works, of St. Paul, Minn., did a large amount of pioneer work. They were among the first to build, exhibit and put upon the market modern cord binders, under the Elward and Levalley patents, I believe. The binder operated fairly well, and they were gaining ground with it, until Appleby and Holmes stepped in before and demolished them.

Chas. B. Withington, Janesville, Wis., patented Feb. 20, 1872, and May 19, 1874, one of the best and most successful wire binders ever put in the field, as attached to the Marsh harvester manufactured by C. H. and L. J. McCormick & Co. This binder differed essentially from the Gordon and other wire binders in its chain movement, in carrying two spools of wire from which the bands were formed, and in other operating devices. (I have not now room for special descriptions of this or other machines.)

In 1874, or early in 1875, Withington sold half interest in his patents to the McCormicks and made general arrangements with them for the development and manufacture of his machines. They built three or four experimental binders for 1875; thirty or forty in 1876, and in 1877 they were put regularly upon the market, where they held first place until 1881, when the McCormicks began building the Appleby.

This binder bound very tightly—making a nice round bundle—and was thoroughly reliable. Nothing but the demand for cord could have driven it out of the market. Withington obtained other patents for himself, and also in connection with W. E. Baker, on improvements of his binder.

No name is so well known among persons interested in harvesting machines as that of John F. Appleby, and no machine ever swept over the world with such overwhelming rapidity—once it got started—as the twine binder designated the "Appleby." This success was not due to the newness of the devices applied, nor to the surpassing character of Mr. Appleby's genius, although he has been a persistent and clear-headed inventor; but it would seem that the ingenuity of a number of inventors running in the same direction had become massed or dammed before certain common obstructions, beyond which they could not flow; and it was reserved for him to combine in his binder—built upon the Marsh harvester—the most practical of these principles, directing the best efforts into one channel; and by devices of his own to remove the obstructions, thus opening the way for the flood that followed.

Mr. Appleby took out patents in 1868-'69 on binder for low-down machine, with the usual result—failure. He became connected with Dr. Bishop early in his work, and sometime in 1873 or 1874 he was at Beloit, Wis., with Parker and Stone. They worked along with varying

hopes and prospects till 1878, when they began to get sure footing. About this time Gammon & Deering became interested, and in 1879, between the latter firm, Parker & Stone and Hoover & Gamble, of Miamisburg, O., a considerable number was built and successfully operated. In 1880 these firms put out some thousands of them—Mr. Deering, successor to Gammon & Deering by far the most; and in 1881 still greater numbers were built. At this time the revolution in the method of harvesters had been accomplished and accepted by all—Mr. Deering having been the leader in this change.

In the fall of 1881 W. N. Whately, the head of the Champion interest at Springfield, Ohio, who had been experimenting largely with low-down and other binders since 1875, bought the interests of Appleby and his assignees, in his many patents. Others had obtained

row bars or along the road, as conveniently as an ordinary reaper.

Standing in line, with bars folded, points up and ready for the road, the steel mower, the steel single reaper and the steel harvester-binder look like members of the same family; to bring about which result Mr. Whately has labored assiduously since he became owner of the original patents.

Mr. Appleby connected himself with the Minneapolis Harvester Works in 1881, as superintendent, and has continued his inventions, taking out various patents since on up and down binders. The foundations of his fame are surely laid.

Next to the Appleby in importance is the Holmes twine binder as manufactured by Walter A. Wood & Co., of Hoosack Falls, N. Y. It is the only competitor of the former and is just as good a machine; in fact as now constructed there is not much difference in their principles—the points of variation consisting in the operating devices. Like the others it was an attachment to the Marsh harvester.

Mr. Holmes, the inventor, began experimenting in this direction as long ago as 1868, it is said. He was poor and struggled along as best he could, until in 1879 when the Wood Company picked him up. His patent was granted Dec. 3, 1878. He tried to get me interested by correspondence and through his son, who visited me for the purpose not so very long before the tide turned with them. At first his machine was unwieldy, but it has been cut down, improved and remodeled until it is a pattern of neatness and symmetry. As manufactured by the Wood Company, it reaches every grain-growing country in the world, their output being many thousands annually.

The fortune and fame which came to Mr. Holmes on account of his inventions were well deserved, and earned through much tribulation.

If I consulted my own feelings I should not say anything about modern low-down or platform machine; but since the Marsh harvester has helped to fully solve the problem of automatic binding, there has been a disposition to make another effort with the *perfected* binder upon the low-down or reaper style of machines. Too much has been done in this direction to be passed unnoticed. Nearly or quite all the manufacturers have been expending money, more or less, in this effort. Probably some one will fully succeed; and already several inventors and manufacturers claim that they have the thing *sure* now. I hope they have.

We have had some experience in this direction. We too felt sure of success. We had faith enough, and sand—till it ran out—and if we could have held on longer probably we should have won, for I still contend that the Marsh-Whitney platform binder is a good one if properly built and decently handled. But we were about two years behind in details of construction and we could not catch up; the seasons happened to be unpropitious to its introduction, and the combined competition was too strong; so as manufacturers we had to walk the plank, but as inventors we are still on deck and propose to bring the thing to port.

Of others in the class Lewis Miller's Buckeye low-down has done the most; and it may be considered now as an active competitor to the elevator class. It is a very neat, compact machine. Seeberling & Co. have had out some machines similar in appearance to Miller's. The Champion folks have done a large amount of experimenting in this direction, but not with satisfactory results, as they view them. The Toledo Mower & Reaper Company have a very pretty low-down which they claim is thoroughly practical and successful. The Gordons, Hodges and others are equally sanguine; and lastly our old friend Sam'l Johnson is out with his, as an attachment to his celebrated self-raking reaper, claiming that he has finally brought it to perfection. He says that the self-rake enables the needle to come down between bunches or detached portions of a gavel, thus solving the problem of separation on a platform binder. We know he has been several years at work on it and that

he is an able inventor. The picture of his machine looks well, and I shall try to see the latter work next harvest.

There are many late and some earlier meritorious inventors whom I have not mentioned, but already this article has spun out too long and I can only hope that no one who reads it will be as tired as I am at its close.

Manufacturers in Wolverhampton, England, are becoming alarmed at the rapid increase of German competition. Not only are Germans competing vigorously with them in neutral markets, but they are underselling them in the home market. It transpired that a leading Wolverhampton tool firm had lost a good South American order for axes because of German underselling; further, that Wolverhampton merchants are now ordering wire nails and screws of German make at prices greatly under those of Birmingham manufacturers. The latter declare that either import duties must be imposed or the operatives must work more hours.

ASSOCIATION OF HARDWARE, STOVE AND IMPLEMENT DEALERS OF ST. LOUIS.

Some of the active business men of St. Louis have recently had frequent conversations with representatives of the *Stove and Hardware Reporter* regarding the necessity of forming an association of those engaged in manufacturing and handling certain lines of merchandise, for the accomplishments of certain objects. These lines embrace stoves, hardware, agricultural implements, etc., and the objects to be attained, the procurement of the most favorable freight rates possible from transportation companies; the adoption of a uniform scale of incidental charges for packages, drayage, loading, etc., and the establishment of a bureau of information from which members can obtain prompt, reliable and specific reports concerning the financial standing and business habits of country merchants making application for credit.

Such an association, if wisely managed, would also benefit the country merchant. It would secure him better freight rates in many instances, and, in addition, furnish him a large measure of protection against dishonest competitors, by having their characters and business methods placed in their true light before all the members of the association.

That an association of the character here outlined is desired, is apparent. In nearly all large cities business men are associated together for these very purposes, and an association now in existence in St. Louis—that of the Wholesale Grocers—is active, vigorous and effective. Business men understand that transportation companies are not disposed to make concessions when they are not asked to do so; that private "special" rates are liable to cancellation at any time; that an earnest, vigorous, protesting "kick" by the foot of associated trade will effect more than the request of any individual; and that they cannot hope to compete as successfully with other cities as they should, unless they enjoy quite as many advantages as business men in those cities do. It is fresh in the minds of the public how an association of St. Louis business men recently brought a powerful railroad company, operating a trunk line between this and an eastern city, to acknowledge their demands for certain freight concessions and accommodations which never would have been granted to individual applicants. The special lines of business, here alluded to, that would receive large benefit by associated efforts in the directions indicated, are of vast importance to St. Louis. There are many millions of dollars invested in them; they give employment to thousands of workmen and employees; they pay the railroads large sums of money annually for carrying their merchandise to all parts of the country, and their aggregated interests are so vast and so important, that, if organized into an associated body, their influence would be able to command profound attention. "In union there is strength," and if our business men wish to reap the available results of such an exhibition of strength as they are capable of putting forth, they can only hope to do so by united and systematic effort.—*St. Louis Stove and Hardware Reporter*.

UNHEALTHY OCCUPATIONS.

Referring to our recent article on "Dust in the Workshop," we find some interesting matter in a paper read a few months ago, before the American Public Health Association, by Dr. C. W. Chancellor. Nearly all trades and manufacturing processes are attended by the evolution of dust or of volatile particles more or less considerable and hurtful. Persons habitually breathing a dust-laden atmosphere of this kind acquire a liability to diseases of various sorts; but, as the inhaled dust is necessarily in every instance brought into contact with the lungs, the pulmonary organs chiefly suffer in the end.

Were we to enter one of the busy workshops of the steel workers, remarks Doctor Chancellor, and for a time, amid the turmoil of machinery, attempt to breathe its stifling atmosphere, charged with minutely-pulverized dust emitted by hundreds of wheels, we would have a practical experience of the causes why few, if even one, of all the workers there will ever reach their fortieth year. The average duration of life among the dry grinders of forks is 29 years; of razor-grinders, 31 years; edge-tool grinders, 32 years; knife and file grinders, 35 years, and saw and sickle grinders, 38 years. The cause of this excessive mortality is apparent. In every 100 sick among

the needle-makers 70 are consumptive; among the file-makers, 62 in 100 are consumptive, and, taking the steel grinders all round, rather over 40 in the 100 are consumptive. Consumption among workers in copper and lead is the predominant disease, and in every 100 lithographers, for instance—workers in copper—one-half nearly are consumptive. But notoriously overtopping all the other dusty occupations in their efforts upon life and health are those of the grindstone-makers, flint-cutters and glass-polishers. The condition under which their work is carried on is in the highest degree favorable to the production of pulmonary diseases. They work in an atmosphere loaded with sharp spicule, which lacerate the lungs and quickly induce consumptive disease. Every grindstone-maker is cut down by it at or soon after the

ter of that textile manufacture—are consumptive. In other words, 60 in every 100 are said to die of that disease. The average life of the weavers of this restricted class is 44 years, while that of weavers in general is about 57. Carpenters, joiners and cabinet-makers are affected by their dusty occupations, each group having 14 consumptive cases in every 100. It is generally believed that the coal-miners' and coal-heavers' occupation is one most highly productive of pulmonary diseases, and on that supposition, when consumption occurs in this class, it is designated "miner's phthisis." Dr. Smart says that in his experience—hospital and otherwise—he had not been able to confirm this prevalent belief, nor does he believe it to be well founded. In every case of so-called "miner's phthisis" which he had seen there was a distinct family history of the disease. It would seem, therefore, that a man predisposed hereditarily to consumption develops it not more readily as a coal-miner or coal-heaver than in any other employment. The black expectoration seen in miner's consumption proves no more than that the coal dust has reached the lungs—certainly not that it is the cause of the disease. Coal-dust—or, to call it by its proper name, carbon—from its highly antiseptic properties, acts as an excellent protection to the pulmonary organs. Dr. Smart further states that among 1,200 sick miners only one case of consumption was noticed.

The effect of breathing animal dusts is shown in the following statistics: The percentage of consumption among brush-makers is 49.1; hair-dressers, 32.1; skinners, 28.2; tanners, 16.2; hatters, 15.5; button-makers, 15.0; harness-makers, 12.8; cloth-makers, 10 per cent

REMARKABLE RECUPERATION.

D. M. Ferry & Co., the well-known seedsmen, of Detroit, Mich., announce that they are on their feet again and ready and anxious to receive orders for seeds from *every one* of their old customers, and from as many new ones as feel kindly disposed toward them. They are in condition to fill promptly every order with new seeds of the best quality.

On January 1 their immense warehouse was destroyed by fire. It was filled with probably the largest stock of assorted seeds ever gathered under one roof. Their books and papers were all saved, and every person who had ordered seeds of them will be supplied with his usual stock. They had large quantities of seeds in their warehouses on their seed farms, in the hands of their growers and not yet delivered, and on the way from Europe, which together with their fully stocked branch seed store in Windsor, Ontario, close at hand, and the free and vigorous use of the telegraph and cable, enabled them to secure a new stock in a remarkably short time.

Before the fire was subdued they had secured new quarters and were devoting all their energies to their customers' interests. In thirty days from the fire they were in perfect working order again.

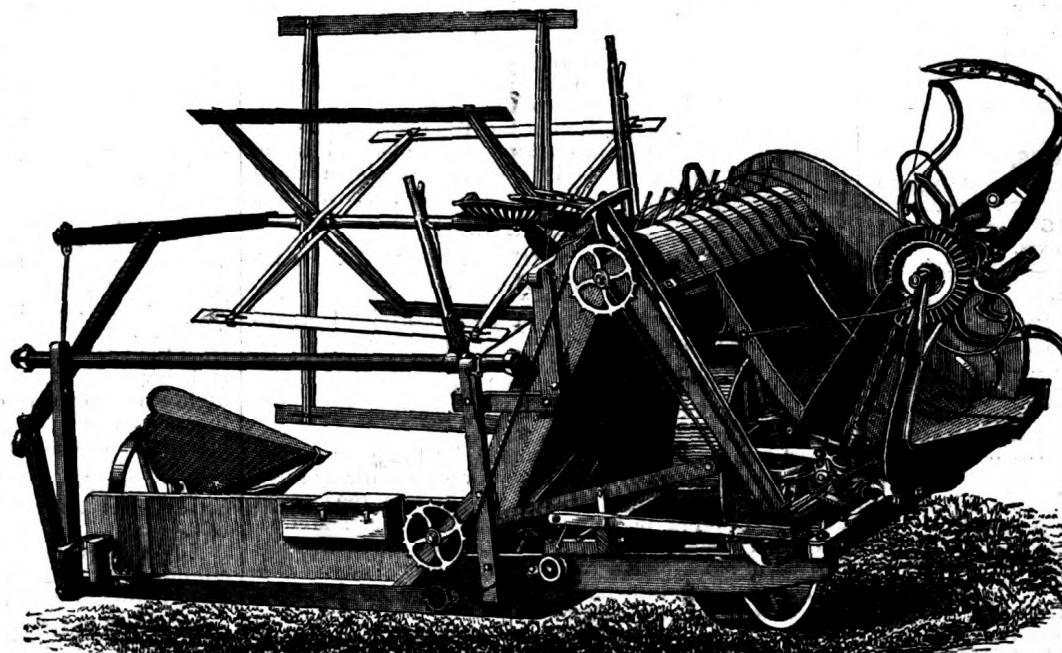
When we consider the magnitude of their business, the appalling destruction of property at the most unfortunate season of the year, we doubt if the annals of history furnish a case of such rapid recuperation. Such energy deserves success.

ALLEN'S AGRICULTURAL MONTHLY.

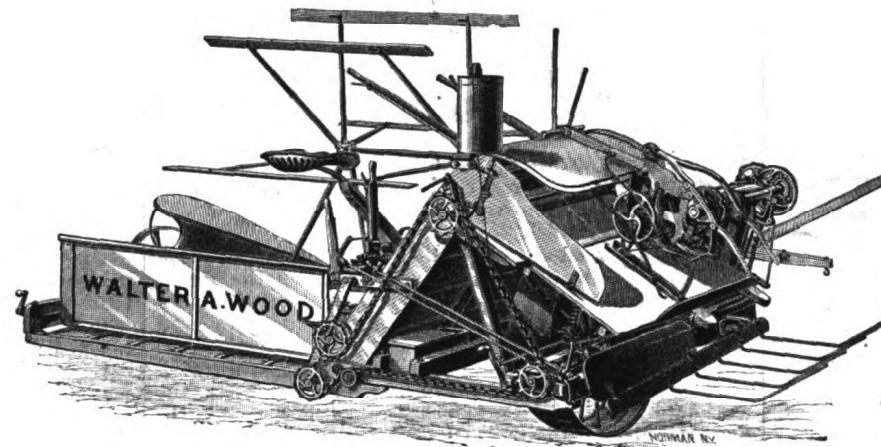
We are in receipt of the first or January number of *Allen's Agricultural Monthly*, published by Hart and Von Arx, 19 Park Place, New York City. It is devoted entirely to United States patents of agricultural implements and machines, and it is so compiled and arranged as to be a work of ready reference for any one concerned in such patents. We like the plan and make up of the magazine very much and consider it indispensable to all parties particularly interested in the business. Price, \$15 per year.

The Logansport Storage and Transfer Company, of Logansport, Ind., are doing a large business as dealers in agricultural implements. They also act as special agents for manufacturers, in the storage, transfer and distribution of farm implements and machines. Manufacturers who are interested in the territory around Logansport will do well to communicate with them.

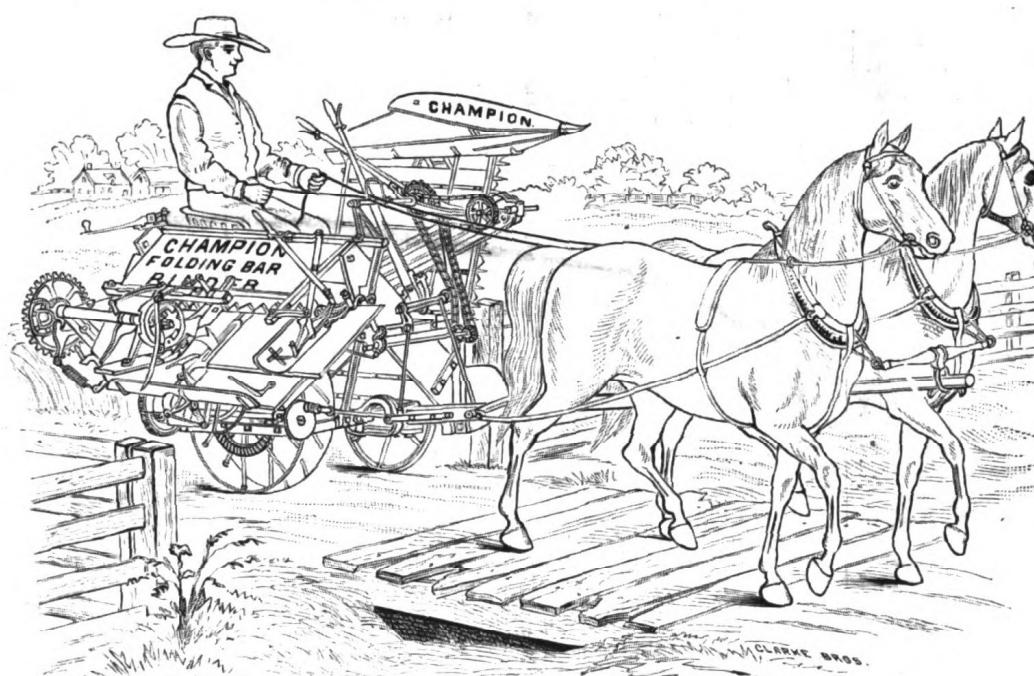
Creosote is now being experimented upon in the British navy as a liquid fuel for the generation of steam. The experimenters claim a hopeful degree of success.



LOCKE'S WIRE BINDER—1873.



WOOD-HOLMRS TWINE BINDER—1886.



WHITELY'S "CHAMPION"—APPLEBY—1886.

age of 24. Hardly one escapes. The flint-cutter and glass-polisher have each 80 deaths per 100 sick of consumption, and their average life is under 30 years. Again, the stone-cutters terminate their average life at the age of 36—36 in every 100 sick being consumptive.

The occupations which are productive of vegetable dust include a somewhat promiscuous and apparently incongruous variety of workers. Among these we have the cigar-maker and the tobacco and snuff worker. Although they enjoy an average life of 55 years, they nevertheless head the list with 36 cases of consumption in every 100. Among the different classes of workers in textile fabrics, the weavers engaged in the cotton, flax and hemp branches are unquestionably the chief sufferers. It is stated on the best authority that three-fifths of the flax-mill workers of Belfast, Ireland—the chief cen-